SEATTLE STEAMER on line

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ARE YOU A GAMBLING MAN?

I used to say that the most useful thing I studied in school was statistics and some of the things that are going on these days with computers and technology seem to prove me right. Back in the old days (I mean before we had a computer on our desk) a manager looked at the facts he had available and made a decision. Sometimes he was right and sometimes he was wrong. Now with all this abundance of data, database to query, spreadsheet to manipulate, not to mention consultants, we seem to look at the facts, look at the facts, look at the facts…..Decisions for some people are harder to come, we never know enough. "Ah, if I only knew that, I could make a decision" I hear people saying, but the fact is that we never know everything,; if we knew everything we would already be there and that would be terrible because there would be no present, and the present is the only present I get these days.

When it comes to information and technology, an anecdote about Enrico Fermi and the Manhattan project comes to my mind. Not many people know that relatively speaking the project was an inexpensive one, two million dollars if I remember right (or was it two billion?). Used to movies costing at least twenty times that much (a movie isn't any good if it does not cost at least a hundred million bucks), two million dollars today is peanuts. The interesting part about the project is that a big chunk of that money went to figure out how powerful was the first A bomb. To do that, with the technology they had available those days, they had to hard wire a bunch of sensors around the New Mexico desert. They had them smack near the bomb, one hundred, two hundred feet away, etc.

Fermi, who was already sick, was no longer active in those days, but he was nevertheless a physicist. So, the day they were supposed to blast the bomb and everybody was scuttling around, he took his notebook to the roof of the control building where all those power arrays were wired in, tore a page from it and tore the page in about ten pieces of different size and spread them around the roof. By estimating the mass of the pieces of paper and the distance they traveled, he was able to estimate the explosive power of the bomb to within two percent of the power measured by the technology (not to mention the $$) of the day.

My approach at times when faced with a decision is to figure out what the probabilities are of being right with the data I have (remember, you never have enough of those), and figure out if it is important to spend money and dollars to get more information. If the odds are good, I go ahead. After all, I do not want to be right all the time, but most of the time.

I was sitting the other day at the annual DCLU retreat (I have been to a bunch of those in my life, but never at DCLU) and I was looking around, my mind in neutral. Well, it did not stay there for long. There were thirty one folks milling around the room drinking coffee and waiting for things to start, and my next question was "what are the odds that someone has a birthday today?"

This turns out to be a counterintuitive argument, and a lot of people guess on the high side. In reality, when you go though the math, it works out that the odds are over fifty per cent at twenty three people. Now, twenty three is what you have on the field in a game of soccer (twenty two players and a referee). With thirty one people in the room, the odds were

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seventy three per cent in favor, more than a sporting chance. By the way, for those interested, it works better if you work out the probability of someone **not** having the birthday in the room and then subtract it from one, stopping when you go over 50%, and count the people in the room.

Now, I was just reaching for a piece of paper and a calculator to figure this problem out, when someone came in with a cake (well actually a big donut) with a candle and we started to sing "Happy Birthday dear Bob…." But wait, it gets better, Bob was actually wearing a soccer shirt. Now, what are the odds of that happening? And then they say you do not learn anything at these affairs.

Now that I got your attention with this useful stuff, I would like to let everybody know that we are moving again. Not quite, the boiler section will stay where we are, in the mezzanine, but just about everybody else in DCLU is moving. It would be safe to say that for the first two quarters of 1999, you can expect some upheaval around the boiler section. Since they will be probably replacing the carpet, we may be displaced for a short time, but other than that, we will be open as usual. Those of you coming to our place to take steam and refrigeration exams may expect some minor inconvenience, like the cashier will be moved, the receptionist will be moved, parking which is already bad in the area will not get any better, and there will be workers all over; but we will do our best to keep people informed of what and where.

The move has become necessary, for a variety of reasons. One is DCLU's commitment to provide better (and faster) service to our applicants for building/land use permits (we need to have the folks providing those services in the same area). The other is that we have been growing, are running out of space, and a rearrangement of some functions to other buildings will be necessary, probably as a temporary solution.

And, in 1999 the name of our department will change to DDCLU or Department of Design Construction and Land Use. (Giovanni)

WILL THERE BE LIFE AFTER GEORGE?

After more than eleven years with the City of Seattle, George Folta is retiring, and it had to happen during my watch. I know there will be life after George, but I know that it will not be the same.

I have known George for almost twenty five years, I just did not know I knew him. One day, after I had been working for the city for a couple of years, I was cleaning up some old pictures and I ran in a group photo taken in Columbus, Ohio at one of the National Board courses. Was it nuclear inspector, or nuclear inspector supervisor I do not remember. So, I took the picture to work, and passed it around, and sure enough George recognized himself a few rows away from where I was sitting. (back in those days nuclear classes were large; now, if they still give them, you would meet all the other students with a single hand shake.) At any rate, he blamed me for my evenings at the bar, while he was hitting the books, for our failure to become acquainted.

Everybody knows George, and that makes talking about him more difficult. George retired after a distinguished career of thirty years in the Navy. He participated in both the WWII and Vietnam conflicts, and between 1952 and 1955 he was chief engineer of the first deck angled aircraft carrier in the world.

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He joined the State of Washington as a deputy boiler inspector in 1974 and became Chief Inspector in 1982. He retired from the state in 1985. George started work for the City of Seattle in 1987. And this is the history behind the man.
What people do not know is that George has been the glue that keeps the department together. You can always count on him for a balanced view of things, a joke when you need one, and a kick in the pants when you need that. And while holding the combined positions of Chairman of the Board and Speaker of the House, George puts a full day in the field.

His last day at work will be February 5, 1999, and I guess that by that time George will be eighty years young. Filling his postion will be a difficult task, but we will give it a try.

RANDOM THOUGHTS FROM ONE THAT'S BEEN AROUND TOO LONG

by George Folta

Some years ago, when I was working for the State, I was the Authorized Nuclear Inspector at the Nuclear Power Division of Boeing. Nuclear power plants were springing up like tulips at Mount Vernon in spring time. We looked down our noses with disdain when someone mentioned fossil fuel power plants. From the distance one could visualize the Satsop cooling towers as two ant mounds because workmen, looking like ants, were swarming all over them. Today they stand as silent monuments to a bygone mistake, but back then nuclear power was on its geometric ascendancy. Shame on the uninformed who suggested any other source of power.

Next to the large "bay" where Boeing was making nuclear power plant components Boeing was making parts for large windmills. "What a waste of money," I replied to my neighbor's wife who was actually ahead of me in her concern for the environment. "You really don't believe that windmills can make an impact on our country's power requirements, do you?"

"I don't know," she replied, "but I know that coal and oil power plants spew particulates and fumes into the air, and that there is always a danger of nuclear meltdown; look at Three Mile Island, and there are questions about getting rid of nuclear waste."

"Beth, we are designing better and better precipitators to clean the stacks of the existing fossil fuel power plants. Rest assured that there are all kinds of safety provisions and inspections required in the building of atomic power plants, and future technology will take care of disposing atomic wastes products. And remember, no lives were lost because of Three Mile Island." She dropped the discussion. Perhaps she was cowed by my know-it-all attitude, or perhaps she decided it was useless to argue against a closed mind.

That was about 18 years ago, and since then there has been Chernobyl, and the construction of nuclear power plants has ground to a halt in the U.S. I'm not saying that's good, I'm not saying that's bad.. But windmills are making progress!

In the August 1998 issue of Mechanical Engineering the Associate Editor, Michael Valenti, wrote an article about wind power in New England. Windmills had been erected in California and some western states, but what

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about the snowy cold New England winters? Valenti tells about 11 high-tech windmills that have been erected in Searsburg, Vermont, that are fairing well. Quoting, "these have generated 3.4 million kilowatt-hours in the first quarter of 1998. This is sufficient power for about 1,500 homes."

And now, I'm eating my words of 18 years ago, for my crystal ball conjures alarming pictures. More and more people are crowding onto this earth. So more and more power is required, and its cost will go up. Where will it come from? Nuclear power plants? No. We still haven't figured out how to get rid of the waste. In this year's August 26 issue of the Wall Street Journal there's an article about the Skull Valley Band of the Goshute Indian Tribe in Utah that would like to erect on their reservation---instead of a casino---a storage facility containing 4,000 15-foot high concrete silos, big enough to temporarily hold about one half the waste from U.S. nuclear-power plants. Of course this is vehemently opposed by Utah's Governor Leavitt, and environmentalists have raised the spectrum of possible danger to the reservation's 10 bald eagles.

There are 105 nuclear plants around the U. S. Putting nuclear fuel in thick concrete casks, where it is slowly cooled by air movement is practiced in 11 of these power-plant sites and 13 others plan to do it as their radioactive absorbing pools fill-up. That takes care of 24 plants, what about the remaining 81? As long as there are people living in the U.S. that remember Chernobyl we can forget additional nuclear power plants, especially with the increase of terrorism. Why? Because people remember what a human mistake can do (Chernobyl), and people realize that nuclear power plants are good targets for attacks by terrorists. We could build some more fossil fuel plants. There are still oil deposits and coal deposits left in this world, but these are not endless. And there will always be a cry against the "dreaded acid rain" caused by these power plants. Let me tell you a story----High school freshman Nathan Zohmer of Idaho recently conducted an experiment in his science class that reveals how continuous foreboding warnings, though some highly exaggerated, can affect people's minds. He told classmates and teachers that they should sign his petition to ban a dangerous substance, "dihydrogen monoxide," which causes excessive vomiting and sweating. He informed them that dihydrogen monoxide is a component in "acid rain". In its gaseous state, it can cause serious burns, and accidental inhalation can kill. To make matters worse, it contributes to soil erosion, decreases the effectiveness of automobile brakes, and it presence has been detected in some terminal cancer tumors. Forty-seven of the 50 students and teachers signed the petition with no questions asked. Not one thought to inquire, "Just what is dihydrogen monoxide?" If they had, they would have discovered that they had signed a petition calling for a ban on H2O—water.

We could build some more dams for hydroelectric power; of course this might wipe out villages upstream and upset some environmentalists because of possible interference with fish spawning or something.

What we need is a power source that does not affect the environment, that

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cannot be stopped by terrorists, alarmed citizenry or overzealous environmentalists, and is endless and free. I can think of three such sources; the motion of the sea, the sun's radiation, and the wind. There are a few locations where the tide actions of the seas are harnessed, and we do have solar panels, and now windmills are starting to be heard.

So this is what I see in my crystal ball: each house will have a roof cluttered with solar panels, a TV antenna, and a small windmill, and in the garage or basement will be a bank of large batteries to store energy for use when there is no sun or wind. Think I'm kidding; look for the next revision in the Installation Permits. Well, maybe not the next revision, but you just wait!!

LOW WATER CUT-OFF DEVICES - PROBE TYPE by Tim Swanson

When testing probe type low water fuel cut offs several problems continually re-occurred on certain types of high-pressure boilers. The secondary control kept shutting down and locking out the boiler, indicating a problem with the primary control. After consulting with several people, and still lacking satisfactory answers, the manufacture had to be consulted. The information given by the manufacture was very interesting and answered many questions. Before 1989, certain manufactures wired the primary and secondary low water controls through one relay. Both probes were at the same depth in the boiler. Doing this allowed the manufacture to use the probes as references to each other. If either probe lost contact with the water the boiler would shut down and lock out. Contrary to popular belief, at this time the primary control was the one in the boiler.

Although this was an acceptable method, there are drawbacks to this arrangement.

- *The primary and secondary low water controls could not be tested separately*
- *Single point of failure; one relay*

In the early 1990's, certain manufactures using the probe type low water cut off added a separate relay for each control. Many people chose to update their boilers with the second relay, however a problem remained. The probes were the same depths in the boiler, making verification of tests difficult. Owner/ operators or a repair concern would have to disconnect or jump one control or the other to test. This was

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an acceptable practice before the adoption of CSD-1 in the State of Washington.

To meet the requirements of CSD-1 certain manufacturers using probe type low water fuel cut offs made another change. The primary control (now in the water column) is 11 ¼" long. The secondary low water is 17 1/8" long. Measuring from the top of the threads the secondary is approximately one inch longer then the primary.

CSD-1 states the primary low water control will shut the boiler down and the secondary low water will lock it out. Both will happen before the water level is below the lowest visible part of the gage glass.

In the 1998 edition of CSD-1 (Mandatory January 1999), part CW-140 states;

Part a) each automatically fired high-pressure steam boiler, except miniature boilers, *shall* have at least two automatic low-water fuel cutoff devices. Each cutoff device *shall be installed* to prevent startup and to cut off the boiler fuel or energy supply automatically when surface of the water falls to a level *not lower than the lowest visible part of the gage glass.* One control *shall* be set to operate ahead of the other.

Part b). Functioning of the lower of the two controls *shall* cause safety shutdown and lockout. The manual reset may be incorporated in the lower cutoff control. Where a reset device is separate from the low-water fuel cutoff, a means shall be provided to indicate actuation of the low-water fuel cutoff. The manual reset may be of the instantaneous type or may include a time delay of not more than 3 min after the fuel has been cutoff.

Part d) A system may incorporate a time delay component with the low-water fuel cutoff device to prevent short cycling. This component shall not constrict any connecting pipe and the time delay *shall* not exceed the boilers manufactures recommended timing, or 90 seconds, whichever is less. The device shall cut off the fuel or energy supply when the wa-

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ter falls to the lowest visible part of the gage glass.

What does this mean? All high-pressure boilers shall have two Low Water Fuel Shutoff devices. The devices must be set at different levels, but both shall cut off the fuel to the boiler before losing a water level in the gage glass. The lower of the two controls shall be a manual reset type. CSD-1 allows delays in low water cutoff devices. To avoid short cycling, the primary can have a delay of up to 90 seconds before cutting off the fuel. On the manual reset low water cutoff, CSD-1 allows a delay of up to 3 minutes on the lockout function (but the fire must go out immediately).

ANOTHER BOILER OWNER HAPPY! By Richard D. Roberts.

It was 08:30 on Monday morning and the phone was ringing. The voice on the other end sounded stressed. The gentleman was with a very large company on the East coast, which operated a 6 year old co-generation plant. It recently had experienced tube failures in the low pressure and high pressure boilers. He wanted to know if our laser based tube mapping system would accurately identify damages in the upper elbow region of the 2.0" boiler tubing. I explained that from past experience we could quite accurately map corrosion or erosion damage in this region of the tube. The laser mapping technology is basically an internal rotating laser caliper. As the laser probe is spinning at 1800 rpm several thousand data points are taken and transferred back to the computer which aligns the data points and color codes them. After the alignment process is completed they are displayed on the computer screen like a photograph of the inside surface of the boiler tube. With the software several types of views can be achieved such as cross and axial sectional cut, 3D isometric and contour views. Analysis of the data can then be easily performed which allows the technician to quickly quantify damages on the inner surface with a confident accuracy of ±0.002". I then offered to provide a demonstration on one of his failed tubes. Based on the references and experience list that I had supplied him, he decided that this was not necessary but needed an inspection crew on site as soon as possible.

At the co-generation plant we met with the Plant Manager. He explained that over the last year the plant had previously tried utilizing two other nondestructive testing methods without success. They would plug or replace the tubes identified as bad but within a few weeks others would fail. Discouraged, the Maintenance Supervisor had decided to replace 100% of the tubes at a cost of around $120,000. The Plant Manager had not given up so easy and decided to try the laser mapping technology which he had heard

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about while in the U.S. Navy. He explained that the tubes were failing at the upper elbow due to steam erosion. He said that they had corrected their operating parameters to reduce the deterioration rate, but had no idea which tubes were near failure or which had no damage.

We began the laser mapping inspection process as the customer looked on. The Plant Manager and Maintenance Supervisor relaxed as we explained the condition of each tube. In a few hours after the inspection we provided them a detailed computerized map of their damaged tubes. The isolated tubes that contained internal erosion damage were all located on the front of the gas flow side and at each end of the steam drum. The customer was impressed with the laser mapping technique but was not going to accept it at face value given their past NDT experience.

The Plant Manager requested the removal of the tubes he had chosen. Some of the selected tubes indicated significant damage, and some were randomly chosen in areas that the laser mapping system indicated as damage free. After the tubes were removed they were cut into cross sectional pieces by a local lab to determine wall loss by way of precision mechanical instruments. The independent lab provided a detailed report to the Plant Manager which was then cross referenced with the laser mapping data. The results were within 0.002" of each other. The Plant Manager and Maintenance Supervisor were finally convinced.

The plant then ordered only those replacement tubes which contained significant damage. The plant manager even went so far as to state that the laser mapping method provided the plant with sufficient information which allowed the plant to defer a $120,000 expense in tube replacement. *(Reference article in POWER MAGAZINE, March/April 1997 issue, Pages 15 & 16)*

CSD-1 WHERE ARE WE? By giovanni Ranieri

In The last couple of issue of the Steamer, we discussed the adoption of CSD-1 by the state of Washington, and by the City of Seattle. In case you have forgotten, CSD-1 is the ASME standard titled "Control and Safety Devices for Automatically Fired Boilers"

As of this writing, the revision to the Seattle Boiler and Pressure Vessel Code has been finalized and sent up the chain of command. My guess is that the revision will be adopted in the city by the end of the first quarter, or the beginning of the second quarter of 1999 (January 1st 1999 for the state).

All gas or oil fired boilers installed after the adoption (and control alterations or burner replacements done after the adoption) of less than 12,500,000 Btu/h input shall comply with the fuel train requirements of CSD-1, 1998. Lined potable water boilers are exempted from this provision.

Boilers in excess of 12,500,000 Btu/h shall comply with NFPA 8501, 8502, 8503, 8504 as applicable to be certified as "automatic" in the City of Seattle.

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Adoption of CSD-1 will not affect existing Automatic Boilers (boilers installed under an Automatic Boiler installation permit) of any input.

AUTOMATION COMES TO DCLU'S ELECTRICAL COUNTER By Giovanni

Late in June 1998, automation began to arrive at DCLU's Electrical Permit Counter, where electrical, elevator, boiler, furnace, refrigeration, sign and simple mechanical installation permits are processed. The boiler part began in August.

For those of you who have already coped with the new forms, this is old news. Although new forms are being used, the information you are providing the counter to get a permit is the same as before.

A few characteristics of the new system should be pointed out. For instance, now the customer gets two copies of the permit: one to post on the job, one for the ofiice. Also, there are two forms, one for boilers, and one for pressure vessels. Whether you apply in person or you send the application by mail, the counter will enter your information in the computer and print out a permit. Since the information needed has not changed, you can use one of the old permit forms (some of you have a stash) if you are applying by mail. Just send in the top copy.

New things to come are on-line applications (available for those having an advanced deposit account), inspection results (http://www.ci.seattle.wa.us/dclu/home.htm), and Interactive Voice Response to schedule inspections.

The boiler site has also been recently revamped courtesy of your former chief boiler inspector and now Webmaster Don Gentry. For those interested in seeing site information on existing boilers and pressure vessels, inspection due dates, size, you name it, the address is http://www.ci.seattle.wa.us/dclu/scripts/boilerSearch.htm

The *Steamer* is generally published quarterly by the City of Seattle, Department of Design, Construction & Land Use, Boiler Pressure Systems Inspection Section. The intent of the publication is to provide information to interested persons in related fields. Readers are welcome to submit material for publication (subject to approval). Any materials submitted for publication will become the property of the Department unless prior arrangements are made. Readers are welcome to reprint any original material (the copyrights of others must be respected); we ask only that you credit the *Steamer* as the source.

Washington State Boiler Inspectors' Association

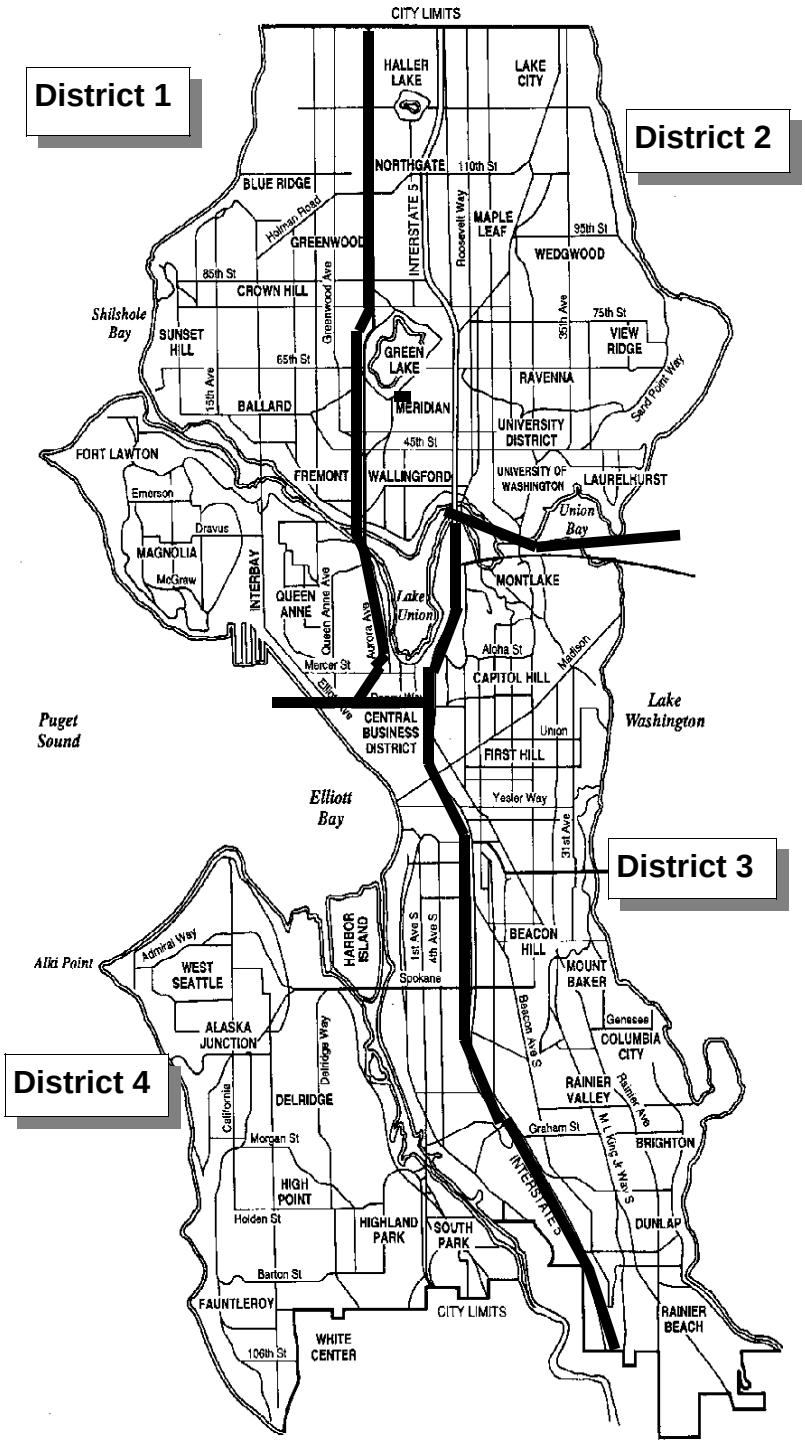
Chris Fulton, Chair (425) 454-3931
Factory Mutual Engineering Assn.

James Dorwin, Vice Chair (425) 430-0494
Hartford Steam Boiler

Chris Villa, Secretary/Treasurer (206) 684-8460
City of Seattle, DCLU

Monthly Meetings are held on the first *working* Monday of each month at Andy's Diner, 2963 - 4th Ave S., approximately two blocks north of Spokane Street. From I-5, take the Spokane Street exit, stay to your right, take the 4th Ave S. exit, then north a few blocks to the restaurant which will be on your left. Lunch is at noon and the meeting is called to order at 12:30 PM.

Inspection Districts in Seattle



INSPECTORS

District 1 - Chris Villa - 684-8460
District 2 - George Folta, 684-5366
District 3 - James McClinton, 684-8462
District 4 - Larry Leet, 684-8461

Telephone Number Reference

Seattle Dept. of Design, Construction & Land Use

Boiler Inspectors
Chris Villa
206-684-8460
George Folta
206-684-5366
James McClinton
206-684-8462
Larry Leet
206-684-8461
FAX **(NEW)** 206-233-7902

Chief Boiler Inspector/ Licensing Supv
Giovanni Ranieri
206-684-8459
email: giovanni.ranieri@ci.seattle.wa.us

Administrative/Inspection/ Billing Info
Gloria Martin
206-684-8418
email: gloria.martin@ci.seattle.wa.us

Steam/Refrigeration License Info/Exams
Evelyn Dunlop
206-684-5174
email: evelyn.dunlop@ci.seattle.wa.us

Seattle Public Utilities Department

Back Flow Prevention Questions/Insp.
Karen Lanning
206-684-7408
Bob Eastwood
206-233-2635
FAX
206-684-7585

Plumbing Inspection In Seattle

Dick Andersen, Chief
206-233-7914
Ginger Ohrmundt, Permits
206-684-5198
Inspection Requests
206-233-2621

State of Washington Boiler Inspection

Olympia - Main Office
Dick Barkdoll, Chief

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